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# Dwarf Fruit Trees

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# DWARF FRUIT TREES SELECTION AND CARE

Dwarf fruit trees have several advantages. They utilize sunshine much better and produce better fruit. Dwarf trees are easier to spray, prune, and harvest. They begin to produce fruit earlier than semidwarf and standard-size trees. They require less space per tree than standard trees. The production per acre is higher with dwarf trees, even though dwarf trees produce less fruit per tree. In general, although dwarf trees require more care, they repay the extra care with earlier and higher production.

A dwarf tree is expected to develop not taller than about 6 to 8 feet. Semidwarf trees are 10 to 12 feet tall, and standard trees may grow as high as 20 feet.

Dwarf apple and pear trees are widely available. Dwarf peach, plum, cherry, apricot, and nectarine trees are generally unsatisfactory. The standard trees of these stone fruits, except sweet cherries, are smaller than standard apple trees and can be restricted in size by pruning.

The size of the tree is determined by the rootstock, the richness of the soil, the size of the variety, the pruning technique, and the earliness of production.

## ROOTSTOCKS AND INTERSTOCKS

**Apples**

All apple trees are grafted. Standard trees are produced by planting seeds, growing the seedlings for 2 years, and grafting the desired variety on them. Dwarfing rootstocks must be propagated vegetatively by rooting the shoots of specific rootstocks in stoolbeds. The East Malling Research Station, East Malling, Kent, England, played a leading role in selecting dwarfing rootstocks from wild small-growing apple species. Therefore, most of the common dwarfing rootstocks carry the designation M (Malling) and a number.

The rootstock with the greatest dwarfing effect that is in common use is M 9. Trees on this rootstock rarely grow larger than 8 feet. However, M 9 has a poor root system which requires good soil and frequent irrigation, and the trees on this rootstock must be staked or grown beside a trellis. Free-standing trees grown on M 9 rootstock without support are often toppled over by the heavy weight of fruit or by high winds.

The next most dwarfing rootstock is M 26. Trees on this rootstock are somewhat larger than trees on M 9. The root system of this rootstock is stronger than that of M 9, but the trees still require staking.

M 7 and M 106 both produce semidwarf trees. Although trees on these rootstocks do not require staking, trees on M 7 rootstock have poor anchorage and may be pushed over by heavy winds. M 2 and M 111 rootstocks produce more vigorous semidwarf trees than M 7 and M 106, and their root systems are less sensitive to diseases. Trees on M 106, M 2, and M 111 are relatively large and require a more laborious training method during their early years.

Trees dwarfed by the interstem method are usually grafted twice. First, a piece of dwarfing rootstock (equivalent to M 9) is grafted on a larger root system of a semidwarf rootstock. The variety is then grafted on the top of the stempiece, which becomes a so-called interstem.

PN–4857

Delicious on M 26 on poor soil with branches pulled down (3 years old).

PN–4858

Golden Delicious on M 106 on poor soil (3 years old).

The length of the interstem determines the degree of dwarfing. Such trees are produced to take advantage of the larger root and the dwarfing effect of the interstem. However, it takes 1 year longer to produce double-grafted trees than single-grafted ones. We consider M 9, M 26, and M 9 interstem to be the only rootstocks that produce truly dwarf trees.

### Pears

Pear trees are dwarfed by using quince root. Some varieties, including Bartlett, do not unite well with quince. In these cases, a compatible variety is first grafted on quince. The desired variety is then grafted on the stem. In fact, most dwarf pear trees are interstem-type trees. However, in this interstem combination the root is dwarfing and the interstem is used only to overcome incompatibility.

The quince is a shallow-rooted tree and requires very good soil with even soil moisture. On poor soils or with inadequate soil moisture pears and quince do not produce well.

## SIZE OF THE VARIETY

Apple trees vary in size regardless of the rootstock they are planted on. For example, Golden Delicious and Jonathan are small trees whereas McIntosh and Delicious are large trees. This means that if Golden Delicious and McIntosh are grafted on the same rootstock the McIntosh tree will be much larger than the Golden Delicious tree.

Fruit growers of the Northwest were the first to notice that some Delicious trees are less vigorous than others. The stems on such trees elongate less and the leaves are closer together on the stem. Such trees produce more spurs on which the fruit is produced. They are called spur-type trees. Various experiment stations have produced spur types of other varieties by artificially-induced mutations.

Today, there are spur types of Delicious, Golden Delicious, Rome, McIntosh, and some other varieties. The spur-type tree of a given variety is much smaller than the non-spur type of the same variety.

Pear trees also differ in size. Magness is the largest of the pear varieties. Bartlett, Moonglow, and many others are considerably smaller. There are no spur-type pears.

## MODIFYING EFFECT OF SOIL

Trees grow better on rich than on poor soil. Therefore, on good soil, one must use a dwarfing rootstock in combination with a small variety. It may even be necessary to use the spur type of a small variety to get a truly dwarf tree.

A Golden Delicious/M 9 or Jonathan/M 9 combination is considered to produce the most dwarf tree. In contrast, a McIntosh/M 9 Delicious/M 9 combination may be too large on good soils and may require the use of the spur type of these varieties or additional pruning as described later. On poor soils, M 9 may produce too small a tree even with Delicious grafted on it. Therefore, M 26 or M 106 with a spur-type variety should be chosen if the soil is poor.

## MODIFYING EFFECT OF EARLY FRUIT PRODUCTION

Early fruiting is the most powerful dwarfing agent we know to date. Some people believe that the dwarfing rootstock produces a dwarf tree because it forces early fruit production and not because it somehow interferes with the growth of the tree. Before fruiting begins, trees on dwarfing rootstock grow about as much as trees on standard roots. They slow down in growth only after the third year when they begin to produce fruit.

On rich soils, or on semidwarf roots, the additional effect of forced early production is needed to produce dwarf trees. Flower buds develop during June and July in the year previous to flowering. Therefore, all manipulation needed to enhance flowering should be done during early summer in order to successfully influence fruiting the next year.

## EFFECT OF PRUNING ON DWARFING

For the development of flowerbuds the tree needs carbohydrates. Severe pruning early in the life of the tree will restrict the leaf area and consequently reduce carbohydrate production. This will delay fruiting and increase tree size. However, occasional pruning is still needed to shape the tree and insure good light penetration to the inside branches and leaves.

The terminal bud of a shoot produces a hormone which keeps the lateral buds from growing. When this terminal bud is removed, the four to six buds below the cut will grow and produce shoots. Therefore, every such heading cut will produce four to six shoots. Sometimes this is desirable; other times it is not.

During the first 2 years of the life of the tree, heading cuts are desirable. During the later years, thinning cuts are more needed. These thinning cuts remove the entire shoot at its base where a visible ring is located. If thinning cuts are made in August they have a strong dwarfing effect on the tree. In contrast, heading cuts, especially when applied during the winter, strongly promote growth.

Pulling or bending the branches down to near horizontal position strongly promotes the formation of flowerbuds. Pulling the branches down can be done in various ways. A string can be tied to the end of the shoot and then to the base of the tree. A styrofoam block can be placed in the crotch angle between the main stem and the side shoot, forcing the shoot into the right position. A clothespin can be used to attach a weight to the end of the shoot, pulling it into the right position.

Any of the above methods will work. If the side shoot was pulled down or bent below the horizontal level it should be released from this position about 3 weeks later. The shoot will not go back to its original position, but if it is left too long in bent position it will produce strong shoots at the top of the bow, which is undesirable. If the trees are grown along a trellis, bending the shoots to the wire and tying them there serves the same purpose.

## PLANTING AND TRAINING OF DWARF TREES

When purchased, dwarf trees may have only a single stem or may have two or three branches along the main stem. Plant them in early spring in areas where the winters are severe; in late fall or early spring in areas where the climate is milder.

Place trees 6 to 8 feet apart depending on soil type, variety, and rootstock.

Trees must be planted in soils which are well drained. In poorly drained soils dwarf trees soon die. If you are not sure about the drainage capacity of the soil, dig the hole for a tree and fill it with water. If the water drains within 24 hours the soil is drained well enough for dwarf trees. If the water remains in the hole after 24 hours, dwarf trees should not be planted at that location.

Plant the trees at the depth at which they stood in the nursery. You can see the change of color of the bark near the root below the graft union. Usually the color of the bark changes at the soil line. Be sure that the graft union is above the ground when you plant the tree. It is better to plant the tree too high than too deep.

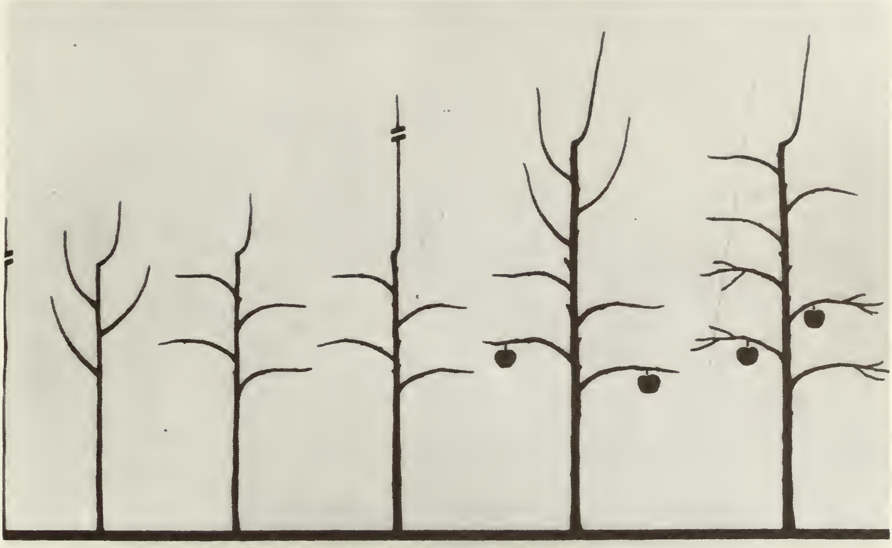
At the time of planting place a metal stake (fence stake) or a 2- to 3-inch-diameter redwood or treated wood post into the hole about 6 inches from the stem. The pole should extend 5 feet above the ground. Pack good topsoil firmly around the roots and water the plant well. Do not apply fertilizer at the time of planting.

After planting, head the tree back about 30 inches above the ground. If the tree has strong side branches, head back the leader about 12 inches above the side branches. The buds below the heading will grow.

When the side shoots are about 12 inches long pull them into horizontal position. If the tree had side branches at the time of planting, pull these down. In the latter case, styrofoam blocks or clothespins are easier to apply than strings.

During the following spring, head back the leader about 12 inches above the first tier of branches. Develop the second tier of branches the same way as you did a year before for the first tier. The first-tier branches should give you a few apples this year.

From this point on you should not need heading cuts. If the tree is too full, use thinning cuts in July or August. If the tree is too high and you want to cut it back make sure that your heading cut is made in such a way that a pencil-size shoot remains on the top. The terminal bud of this small shoot will produce enough



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**Development of a dwarf tree. First year: A, after planting is pruned back at the mark; B, the side shoots are developed; C, side shoots pulled down. Second year: D, leader is cut back; E, second tier of branches developed; F, side shoots of second tier pulled down.**

hormone to keep the other buds from growing.

## FERTILIZING

Dwarf trees require a well-limed soil. Liming can be done successfully only at the time of planting. Mix about 10 pounds of dolomitic limestone into the soil dug out from the hole. Make sure that the lime is thoroughly mixed with the soil.

Do not apply fertilizer in the year of planting. From the second year on, apply fertilizer only when shoots make less than 12 to 18 inches of growth and the leaves are light green. The only exception is Golden Delicious, which normally has pale green leaves.

When fertilizer is needed the ideal choice is 10-4-10 at a rate of ½ pound per year of age of the tree. If this fertilizer is not available, apply the available mixture at the same calculated rate for nitrogen. For example, if you have a 20-6-4 fertilizer, use half the recommended rate. (The first number is the one that indicates the percentage of nitrogen in the mixture.)

## MULCHING

Mulching is an excellent practice for growing dwarf trees. Mulch provides a better uptake of nutrients, insures a more even supply of moisture, and prevents the overheating of soil around the roots.

Keep mulch away from the trunk: this keeps mice away from the tree. Sharp bluestone chips can be put around the trunk if they are available. This keeps rodents away from the trunk and prevents them from damaging the bark during the winter.

Rabbits may also damage the bark. To protect against rabbits a chicken wire mesh should be placed around the trunk of each tree.

## PEST CONTROL

Control of insects and fungus diseases is an important part of successful fruit production. Obtain information on recommended practices for pest control from the State agricultural experiment station.

Two new apple varieties, Prima and Priscilla, are resistant to apple scab, an important fungus disease of apples. These varieties do not require sprays against apple scab. However, they still need protection against insects.

Dawn, Moonglow, Magness, Mac, Maxine, and Seckel pears are resistant to fireblight, a bacterial disease. Since the eastern climate (with the exception of cool areas in Michigan and New York) is not generally suitable for pear production because of fireblight, we recommend that only resistant varieties be planted in these areas.

## OTHER PUBLICATIONS

For additional publications on the selection and care of semidwarf trees, see Agriculture Handbook 458, "High-Density Apple Orchards — Planning, Training, and Pruning," or Farmers' Bulletin 1897, "Establishing and Maintaining Young Apple Orchards." Both are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

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